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ABSTRACT

Results of a subtest of the Project Access battery, comparing the influence of race, sex and city on inductive reasoning items, are presented. The participating Junior High students represented three racial groups, Black, White, and Mexican Americans, from three cities, Los Angeles, Memphis, and Washington, D. C. The test, entitled Letter Groups, contained 25 vowel/consonant items instructing the student to find the rule which related four of a set of five to each other. The correct answer was a single unrelated set. Results indicated that the majority group (Whites) fared better than did the minority groups (Mexican Americans or Blacks); comparisons by city, whether between race or within race, indicated the best performing group was the Memphis Whites, and the second best the D. C. Blacks; and comparisons by sex indicated close performance patterns between males and females, but wherever significant differences did occur, it was the female who was favored. (Author/LS)

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EDUCATIONAL TESTING SERVICE
PRINCETON, NEW JERSEY
BERKELEY, CALIFORNIA

PROJECT ACCESS RESEARCH REPORT #4

Influence of Race, Sex and City on Inductive Reasoning Items

Alfred H. Gitlitz and Nadeen L. Kaufman

College Entrance Examination Board

Project Access is a program of the College Entrance Examination Board that has received financial support from the Ford Foundation. Parts of the program are conducted for the Board by Educational Testing Service. The goal of Project Access is to increase the access to post-secondary education for minority/poverty students. It is also the intent of the Board and ETS to apply the knowledge gained in this endeavor to other testing and measurement activities that affect these students.

In the 1969-70 school year, a nine-test Project Access battery was administered, together with a Biographical Inventory, to approximately 18,000 junior year students in three cities: Los Angeles, Memphis, and Washington, D.C. Within each city, schools were chosen on the basis of interest and willingness to participate.

This study is concerned with one of the nine subtests in the battery, a test of inductive reasoning entitled Letter Groups. This test contained 25 items, and 15 minutes were allowed for completion. For each item, five sets of four letters each were presented. The student was instructed to find the rule which relates four of the sets to each other; the correct answer is the single set which does not fit the rule.

There are three sources of interest in analyzing this particular subtest of the Project Access battery: (1) Flaugher (1971) found that the difference in performance on this test between Black and White students was somewhat less than the discrepancies found in the Vocabulary and Mathematics

tests. A similar but less pronounced trend was also found between Mexican-American and White students. As Flaugher pointed out, "the fact that the trend did occur in most of the situations where it was possible would indicate that some non-chance influence is at work and that these differences deserve further consideration."

(2) Any change in this test that would reduce the difference in performance of students from different ethnic backgrounds could be of great consequence to a large number of students. Flaugher (1971) pointed out that because of the very large numbers of students involved in national testing programs,

> even slight differences in test score can be of consequence to a great many students, particularly in settings of competition for postsecondary educational opportunities. For example, on the basis of these results, the consequences of utilizing Letter Groups in a testing program, either in addition to the traditional verbal and math measures or as a substitute for one of them, would be higher scores for many Black and Mexican-American students.

(3) If differences in performance of students from different ethnic backgrounds could be reduced, the correlation between the test and ethnic membership would be reduced. If the differences could be completely eliminated, thus the correlation between "culture" and the test becomes zero, the test would then be "culturally fair" by Darlington's (1971) most rigorous definition (definition 4).

This analysis, therefore, attempts to examine, by means of item analysis techniques, the possible causes of the discrepancies in performance on the Letter Groups test by various groups.

METHODOLOGY

The strategy was to look at the 25 Letter Groups items and determine whether or not they could be further categorized into subgroups on the basis

of the particular cognitive tasks demanded in the solution of the item. Analyses consisted of comparisons of item Deltas[1], by race, by city, by sex, and by race and city, to determine whether certain item "categories" were differentially more difficult (had higher Deltas) for some groups than were other item "categories."

Description of Item Categories

The Letter Groups test was given to three professionals in psychological measurement who were instructed to group the items into as many categories as each independently felt was necessary. Despite a difference in nomenclature, the groups which each arrived at were virtually identical, thus ensuring, in an informal way, the reliability of the categories which are presented below.

A. Type of Letters involves the utilization of a "commonly known" fact to be incorporated in the respondent's choice. Two items (numbers 8 and 25) represent this grouping. Item 8 (CAEZ CEIZ CIOZ CGUZ CAUZ) requires the examinee to know the rules governing vowels and consonants, and to choose the one that does not have a middle pair of vowels. Item 25 (AOUI CTZR JHTN PBRL RTVH) requires the examinee to choose the only grouping of letters

[1]Delta is the index of item difficulty customarily used by Educational Testing Service. It is defined by the relation Delta = 13 + 4Z, where Z is the normal deviate corresponding to the proportion of persons who got the item right. When the proportion is greater than .50, Z is less than 0; when the proportion is less than .50, Z is greater than 0. When the number attempting the item is less than the total sample, a correction is made for ability change of the group. Number attempting includes number right, number wrong, and number omitting, but excludes number not reaching the item.

that are not all consonants. Both of these items focus attention on the vowel-consonant dichotomy and not on the test-taker's basic ability to order letters alphabetically.

B. Repeated Patterns is a category of items that presents the examinee with a rule or pattern which is repeated and challenges him to pick out the grouping which violates the existing pattern. Included in this category are seven items (1, 4, 6, 10, 12, 13, and 18). For example, item 13 (ABCX EFGX IJKX OPQX UVWZ) sets the constant end letter of "X" on all valid groups. The fact that the letters are in alphabetical order is irrelevant; it is the repeated variable of a tail "X" in four of the letter groups which establishes the pattern in this particular item.

C. Order of Letters -- Whole Patterns deals with all four letters of a sample group and some kind of alphabetical order. It emphasizes a Gestalt view of the entire tetrad. Eight items (3,5,9,14,17,19,20, and 22) comprise this category. Item 9, for example (BDEF FHIJ HJKL NPQR SVWX), requires the respondent to study all four letters in deciding what the alphabetical pattern established encompasses. In this case the letter following the first in each group is skipped, but the other three follow the continued alphabetical progression.

D. Order of Letters -- Partial Patterns also involves specific alphabetical patterning, but splits the four letters up into two groups requiring the examinee not to incorporate all four letters into his answering process at one time. This group consists of seven items (2,7,11, 15,16,21, and 24). In item 21, for example (CERT KMTV FHXZ BODQ HJPR), each letter group

has two parts (first two letters and last two letters) in separate alphabetical order where the middle letter is skipped; i.e., C (D) E, R (S) T; K (L) M, T (U) V; etc. Although all four letters are involved, the respondent must focus on first one part and then the other part of the group rather than study the group in its entirety, as is the case in category C.

E. Total Gestalt of Repeated Patterns is a category composed of item 23 alone. This grouping combines elements of three other categories, B, C, and D. The examinee is required to find a repeated pattern, as is the case with category B, and part of each letter group is involved (category D); alphabetical order is utilized (categories C and D). What makes this category different is that letter groups are not separate entities in themselves, but must be viewed as part of a total Gestalt. For example, item 23 (PXCC EEQX RXGG IISX TXLL) maintains a double letter in each letter group which happens to be part of an alphabetical progression across groups: CC (skip the letter D); EE (skip the letter F); GG (skip the letter H); II (skip the letter J); etc.

Classification of Item Difficulty Levels

Once categorized, the items were further classified by their difficulty levels. Mean Deltas were computed for each item on the basis of data obtained on the following groups: (1) Los Angeles: Mexican-Americans (Total); (2) Los Angeles: Whites (Total); (3) Los Angeles: Blacks (Total); (4) Memphis: Whites (Total); (5) Memphis: Blacks (Total); and (6) Washington, D.C.: Blacks (Total). The items were ranked according to their

mean Deltas and were then divided into the three approximately equal groups of Easy, Medium, and Hard. Table I shows which items, by category, belonged at each level of difficulty. It is interesting to note that with only one exception (item 3), all Easy items were of Type B classification.

RESULTS

The data obtained from each group participating in the Project Access administration were analyzed in the form of 14 different group comparisons. These 14 comparisons break down into four natural divisions: (1) comparisons by race, (2) comparisons by city, (3) comparisons by sex, and (4) comparisons by race and city combined. The results for each of these divisions will be discussed separately.

1. Comparisons by race. Under this division four comparisons were performed:

(a) L.A. Blacks versus Whites

(b) L.A. Mexican-Americans versus Whites

(c) L.A. Blacks versus Mexican-Americans

(d) Memphis Blacks versus Whites

There were 72 possible comparisons between majority (White) and minority (Black or Mexican-American) performance on items.[2] Of these, there

[2]This number is arrived at by multiplying the number of items by the number of comparisons considered. The majority vs. minority analysis included three comparison groups: L.A. Whites vs. L.A. Blacks; L.A. Whites vs. L.A. Mexican-Americans; Memphis Whites vs. Memphis Blacks. Whereas Letter Groups is a 25-item test, only 24 items were utilized in computations; item 25 had to be eliminated from most analyses due to insufficient data. Thus, if one multiplies the 24 items by the three comparison groups, 72 possible chances for item discrepancy will emerge between majority and minority groups.

were 42 significant[3] differences, all in favor of the majority group. (See Tables II and III.) However, more than half of these (24 of the 42) were attributable to the much higher scores achieved by the White groups in Memphis, which resulted in significant differences on all items in the test.

A certain pattern emerges from these comparisons of majority versus minority groups. Of the 8 category C items, 17 out of a possible 24 chances showed significant differences in favor of the majority group. Out of the 7 category D items, 13 out of a possible 21 chances showed significant differences in favor of the majority. Of the 7 category B items, only 9 out of a possible 21 instances of differential performance occur favoring the majority group.

When one looks at the comparison between L.A. Mexican-Americans and Blacks, two groups with great ethnic differences but which both occupy minority status in the United States, we see only 2 instances of differential performances out of 24 possible chances. Thus, two racially very distinct groups performed almost equally on the Letter Groups test, yet in comparison with another racially distinct group, which occupies majority status in this country, both the Blacks and Mexican-Americans in Los Angeles performed relatively more poorly.

For the most part, items that were easy for the majority group were also easy for the minority groups. Conversely, items that were most difficult for the majority group were also most difficult for the minority groups. Spearman rank order correlations ranged from .946 to .962 across the various groupings.

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[3]Mean differences in item Deltas at the .01 probability level were considered significant.

The following items (with their corresponding difficulty levels included) are those that proved to be the most consistent in displaying a greater discrepancy between racial groups:

item 11, category D, Medium difficulty level

item 16, category D, Medium difficulty level

item 17, category C, Medium difficulty level

item 18, category B, Medium difficulty level

item 20, category C, Medium difficulty level

item 5, category C, Medium difficulty level

item 7, category D, Medium difficulty level

Thus, the items which produced the widest discrepancies between racial groups were of medium difficulty, and all but one involved the alphabetical ordering of letters (categories C and D).

Most of those items that produced the least discrepancy between these comparison groups were those in category B and therefore of Easy difficulty level. Of 7 category B items, 6 showed virtually no differences in performances between these racial groups.

2. Comparisons by city. In this analysis, race was held constant while the effects of each city were compared within racial groups. Thus there were four comparison groups:

(1) L.A. Blacks versus Memphis Blacks

(2) L.A. Blacks versus D.C. Blacks

(3) Memphis Blacks versus D.C. Blacks

(4) L.A. Whites versus Memphis Whites

Of 96 possible chances for item discrepancy there was a total of 61 instances of significant differences. There were no trends in either item

category or difficulty level. The results of inter-city comparisons point to higher overall scores of D.C. Black students and Memphis White students. (See Tables IV and V.)

3. Comparisons by sex. In this analysis, performance by sex was looked at for all groups in which the data were available.[4] The following four comparisons were made:

(1) L.A. Mexican-American: Male versus Female

(2) Memphis Whites: Male versus Female

(3) Memphis Blacks: Male versus Female

(4) D.C. Blacks: Male versus Female

Out of a possible total of 93 chances for item discrepancies to occur between males and females, 26 showed significant differences. With the exception of Mexican-American students, all of these differences showed higher performance by females. Two items showed sex differences for Mexican-American students, both in favor of males. None of these items showed any trend in terms of item category or difficulty level.

Of the 26 significant differences, 11 were from the Memphis White samples, and 9 were from the Memphis Black samples. Only one item (C20) showed an advantage for females over males in three of the four comparisons. (See Tables VI and VII.)

4. Comparisons by race and city. Since there was no White group in Washington with which to make racial comparisons, the results of the Washington Blacks (which happened to be the best performing Black group) were

[4] Sex breakdowns for L.A. Blacks and Whites were not available.

compared, in turn, to the two available White groups: the lower performing White group (L.A. Whites) and the better performing White group (Memphis Whites).

Washington, D.C. Blacks performed significantly better than L.A. Whites on only two items, both of the B category (B12 and B18); L.A. Whites were significantly favored on only one item (C22). Out of a possible 24 chances for significant discrepancies to occur, there existed only 3; otherwise it can be said that the two groups performed virtually equally as well. The D.C. Blacks versus Memphis Whites comparison indicated widely different performances by the two groups. Memphis Whites found a total of 21 items out of the possible 24 significantly less difficult. On two items there were no discrepancies (A8 and C22), and D.C. Blacks performed better on one item (B18). (See Tables VIII and IX.)

Summary of Results

Results indicated that the majority group (Whites) fared better on the Letter Groups test than did minority groups (Mexican-Americans or Blacks). The items causing the widest discrepancies in racial performance were items of Medium difficulty in categories C and D. The items on which the dichotomy in group performance was the narrowest between races were clearly those of Easy difficulty level in category B.

When results are looked at by city, whether within race or between race, the best performing group is Memphis Whites, and the second best is D.C. Blacks.

Comparisons by sex indicated close performance patterns between males and females, but wherever significant differences did occur, it was, with two exceptions, the female who was favored.

DISCUSSION

At first glance, one is tempted to say that the above findings indicate that group performances are strongly influenced by the racial or ethnic membership of that group. But on closer inspection the results actually belie this to a certain extent. On the one hand, there were virtually no differences between the performance of Black and Mexican-American samples in Los Angeles, two very distinct and different ethnic groups. Perhaps belonging to a majority or a minority group is more important than membership in a particular ethnic group. On the other hand, there were practically no differences between the Los Angeles White and the D.C. Black samples. This leads one to conjecture that the differences found with other comparison groups are more than likely due to some other factor, for example, socioeconomic status, since the selection process for participation in Project Access was different for each city. In Los Angeles, a selected group of inner-city schools, characterized by low socioeconomic status, participated in the study. Thus the Whites in the Los Angeles sample were a relatively homogeneous group, almost totally of the lower socioeconomic stratum. In this situation, where the social class of the races was more nearly equal (though probably still far from equal), the huge difference that was found, for example, between Memphis Whites and Blacks did not occur. The difference was much more moderate, and on one general classification of item -- category B -- there were no significant differences at all.

In Memphis and Washington, on the other hand, virtually the entire school systems participated. This resulted in the inclusion of a large

number of White students from high socioeconomic backgrounds in the Memphis sample, and a large number of Blacks from high socioeconomic backgrounds in the Washington results. Socioeconomic factors, concomitant with majority/minority status, rather than race (or city) can explain why Memphis Whites and D.C. Blacks were the two superior performing groups.

The results of this study have indicated a possible relationship between item category and performance by different socioeconomic groups on the Letter Groups test. Item category is, therefore, a variable that should be considered both during test construction and test interpretation. On the basis of the present results, it appears to be possible to reduce or widen the discrepancies in performance on the Letter Groups test between different groups by the way one selects items from the categories. For example, if more category B items and less category C items were used on this Letter Groups test, the result would be a narrowing of the gap between Whites and Blacks in Memphis, and Whites, Blacks, and Mexican-Americans in Los Angeles.

In light of the findings of the present study, it seems advisable that the items on the Letter Groups test, and tests of related tasks, be evaluated in terms of difficulty level and category. The interaction between item category and item difficulty has not been clearly established since it is not known whether performance on those items of Medium difficulty was caused by some quality inherent in that level of difficulty or whether performance on Easy and Hard items was influenced by floor and ceiling effects respectively. It might be worthwhile to develop more items so that each category has a complete range of difficulty levels. Moreover,

since each item category represents a different cognitive task, it is incumbent upon test developers to define first the cognitive ability to be measured and then develop the items which best measure it. The test could then reflect those abilities that are of greatest value to educators by including more items in those categories which best measure those particular abilities.

SUGGESTIONS FOR FURTHER RESEARCH

1. The present study should be replicated with one added feature: rather than making intuitive assumptions on the socioeconomic status of the subjects, Project Access biographical data should be utilized so that subjects can be identified and matched on critical socioeconomic variables, e.g., father's occupation, educational level, income, etc. Thus, a control on socioeconomic status would be established which was not present in this study.

2. The strategy used in this study, in which items were broken down into categories representing specific cognitive tasks, could be used to analyze performance on other tests. The purpose of this would be to see whether the relationship found was peculiar to inductive reasoning, in general, the Letter Groups test, in particular, or was generalizable to group performance on tests of other abilities.

References

Darlington, R. B. Another look at "cultural fairness." Journal of Educational Measurement, 1971, 8, 71-82.

Flaugher, R. L. Project Access Research Report No. 3: Minority versus majority group performance on an aptitude test battery. Research Bulletin 71-48. Princeton, N.J.: Educational Testing Service, 1971.

TABLE I

LEVEL OF DIFFICULTY	CATEGORIES					
	A	B	C	D	E	TOTAL ITEMS
HARD (13.1 - 16.6)	8, 25		19, 22	21, 24	23	7
MEDIUM (11.3 - 12.8)		18	5, 9, 14, 17, 20	2, 7, 11, 15, 16		11
EASY (8.1 - 10.4)		1, 4, 6, 10, 12, 13	3			7
TOTAL ITEMS	2	7	8	7	1	25

KEY: Item numbers are written in the Category x Difficulty cells; frequencies are written in the "Total"cells. The ranges of the mean Delta values are indicated in parentheses for each of the three levels of difficulty.

TABLE II

OCCURRENCES OF STATISTICAL SIGNIFICANCE
PRODUCED BY LETTER GROUP ITEMS
BY RACE

	A	B							C							D							E
BY RACE	8	1	4	6	10	12	13	18	3	5	9	14	17	19	20	22	2	7	11	15	16	21	24	23
L.A. Mex.-Am.																							-	-
L.A. Whites	x							x	x		x		x		x	x			x		x		-	-
L.A. Mex.-Am.										x								x						
L.A. Blacks																								
L.A. Whites								x		x		x	x		x			x	x		x		x	
L.A. Blacks																								
Memp. Whites	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Memp. Blacks																								

KEY: An "x" indicates which group (row) was significantly higher than its counterpart on each item (column) at the .01 level of significance.

TABLE III

DELTA DIFFERENCES IN GROUP PERFORMANCE
ON EACH ITEM -- BY RACE

Differences	LOS ANGELES			MEMPHIS
	Whites - Mex.-Am.	Mex.-Am. - Blacks	Whites- Blacks	Whites- Blacks
3.0 & above				C17, C5
2.9				C20.
2.8				
2.7				
2.6				C14
2.5				D21
2.4				D16
2.3				
2.2				B4, C9, B12, D11
2.1				
2.0	D16		C5	D24
1.9			D16	B1, D15, D7
1.8			C17	
1.7	C17, C20		C14, D7	C3
1.6	C22, D11		C20	B10
1.5	C3, C9		D11	B6
1.4				B13
1.3	B18		B18, D24	D2
1.2	A8	D7		
1.1	B10, B13	C5	B13, D21	C19, C22
1.0			B10, C19	E23
0.9	C5	B4, C14	C9	A8
0.8	C14, C19	B6, D15	B4, C22, C3, D15	
0.7			D2	
0.6	D21	B1	A8	
0.5	D2, D7	D21	B1	B18
0.4			B6	
0.3	B12	D2		
0.2		C19		
0.1		C17		
0	D15	B13, B18		
-0.1	B1, B4	B10, D11, C20, D16		
-0.2				
-0.3			B12, E23	
-0.4	B6			
-0.5				
-0.6		A8, C9, B12		
-0.7		C3		
-0.8		C22		
-0.9				
-1.0 & below				

KEY: Broken lines represent confidence intervals. Positive differences refer to the group listed first in the comparison and indicate a lower Delta on that item for that group. Conversely, negative differences indicate that the second-mentioned group had a lower Delta on that item. For example, item B6 in the comparison between L.A. Whites vs. Mexican-Americans was four-tenths of a point easier for Mexican-Americans than for the Whites.

TABLE IV

OCCURRENCES OF STATISTICAL SIGNIFICANCE
PRODUCED BY LETTER GROUP ITEMS
BY CITY

	A	B							C								D							E
BY CITY	8	1	4	6	10	12	13	18	3	5	9	14	17	19	20	22	2	7	11	15	16	21	24	23
Memp. Blacks							x							x			x	x						
L.A. Blacks																x								
Memp. Blacks																								
D.C. Blacks	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x	x	x	x		
L.A. Blacks																								
D.C. Blacks	x	x	x	x	x	x		x		x	x	x	xx	x	x		x	x	x	x	x	x	x	
Memp. Whites		x	x	x		x	x			x	x	x	x		x		x	x		x	x	x	x	
L.A. Whites																								

KEY: An "x" indicates which group (row) was significantly higher than its counterpart on each item (column) at the .01 level of significance.

TABLE V

DELTA DIFFERENCES IN GROUP PERFORMANCE
ON EACH ITEM -- BY CITY

Differences	Memphis Blacks - L.A. Blacks	Wash. D.C. Blacks - Memphis Blacks	Wash. D.C. Blacks - L.A. Blacks	Memphis Whites - L.A. Whites
3.0 & above				
2.9				
2.8				
2.7				
2.6				
2.5				
2.4				
2.3			B18	B12
2.2				
2.1				
2.0				
1.9		B18		B1
1.8				D4
1.7				C17
1.6			C20	C5
1.5		B12, C20	B4, C5	C14, D2
1.4			D11	C20
1.3			B12, D16, D7	B6, D15
1.2		D11, D21	B13, D15, C17	B13, D24
1.1		B4, C9	B1, C19, B6, D2	D16, D21
1.0		B10, D15	B10, C14	C9, D17
0.9	B13, D2	B6, C5	D21	D11
0.8	D7	C17	C9	C19, E23
0.7	C19	A8, D16, C22	A8, D24	
0.6	C5, D16, C14	B1		B10
0.5	B1, D24	D7		C3
0.4	B4, C17, B18	C14, C19		
0.3		B13, C3		A8
0.2	B6, D15, D11	D2, D24		
0.1	C20	E23		
0	A8, B10			
-0.1			C3	
-0.2	B12		C22	
-0.3	C9, D21			
-0.4	C3		E23	B18
-0.5	E23			
-0.6				C22
-0.7				
-0.8				
-0.9	C22			
-1.0 & below				

KEY: Broken lines represent confidence intervals. Positive differences refer to the groups listed first in the comparison and indicate a lower Delta on that item for that group. Conversely, negative differences indicate that the second-mentioned group had a lower Delta on that item. For example, item C22 in the comparison between Memphis Blacks and L.A. Blacks was nine-tenths of a point easier for L.A. Blacks than for Memphis Blacks.

TABLE VI

OCCURRENCES OF STATISTICAL SIGNIFICANCE
PRODUCED BY LETTER GROUP ITEMS
BY SEX

	A	B							C								D							E
BY SEX	8	1	4	6	10	12	13	18	3	5	9	14	17	19	20	22	2	7	11	15	16	21	24	23
L.A.Mex.-Am. Male				x		x										-							-	-
L.A.Mex.-Am. Fem.																-							-	-
Memp. White Male																								
Memp. White Fem.			x		x	x	x	x						x	x				x		x	x	x	
Memp. Black Male																								
Memp. Black Fem.	x			x		x	x		x		x			x	x				x					
D.C. Black Male																								
D.C. Black Fem.	x							x							x									x

KEY: An "x" indicates which group (row) was significantly higher than its counterpart on each item (column) at the .01 level of significance.

TABLE VII

DELTA DIFFERENCES IN GROUP PERFORMANCE
ON EACH ITEM -- BY SEX

Differences	L.A. Mex.-Amer. Males - Females	Memphis Whites Females - Males	Memphis Blacks Females - Males	Wash.D.C. Blacks Females - Males
3.0 & above				
2.9				
2.8				
2.7				
2.6				
2.5				
2.4				
2.3				
2.2				
2.1				
2.0				
1.9	B6			
1.8				
1.7				
1.6				
1.5	B12			
1.4		C20		
1.3				
1.2	C14, C19			
1.1				
1.0	B4, D15			
0.9	C17	B18	B13	
0.8	D7	D16		B18, C20, E23
0.7	B13, C20	B4, B12, B13, D24	B12	
0.6	D16	B19, C19	C19, C20	A8
0.5	B1	D21	A8, B6, D11	
0.4	D21	A8, C9, C22, D2	C3, C9	B12, B13, C9, C22, A24
0.3	D2	C5, C17, D7, E23	D15, D21, E23	C14, C17, C19, D7, D11, D16
0.2	A8	B6		
0.1		C3, C14	B10, C17, D12, D7, D16	D2
0			B1	C5
-0.1	C3	B1	B18, C5, C14, C22	B6, C3, D15
-0.2	B18, C5		B4, D24	B11, B4, B10. D21
-0.3	B10, D11			
-0.4				
-0.5				
-0.6	C9			
-0.7				
-0.8				
-0.9				
-1.0 & below				

KEY: Broken lines represent confidence intervals. Positive differences refer to the group listed first in the comparison and indicate a lower Delta on that item for that group. Conversely, negative differences indicate that the second-mentioned group had a lower Delta on that item. For example, item C9 in the comparison between L.A. Mexican-American Males and Females was six-tenths of a point easier for the Females than for the Males.

TABLE VIII

OCCURRENCES OF STATISTICAL SIGNIFICANCE
PRODUCED BY LETTER GROUP ITEMS
BY RACE AND CITY

	A	B							C								D							E
BY RACE AND CITY	8	1	4	6	10	12	13	18	3	5	9	14	17	19	20	22	2	7	11	15	16	21	24	23
D.C. Blacks						x		x																
L.A. Whites																x								
D.C. Blacks								x																
Memp. Whites		x	x	x	x	x	x		x	x	x	x	x	x	x		x	x	x	x	x	x	x	x

KEY: An "x" indicates which group (row) was significantly higher than its counterpart on each item (column) at the .01 level of significance.

TABLE IX

DELTA DIFFERENCES IN GROUP PERFORMANCE
ON EACH ITEM -- BY RACE AND CITY

Differences	L.A. Whites - D.C. Blacks	Memphis Whites - D.C. Blacks
3.0 & above		
2.9		
2.8		
2.7		
2.6		
2.5		
2.4		
2.3		C17
2.2		C14
2.1		C5
2.0		
1.9		
1.8		D24
1.7		D16
1.6		
1.5		
1.4		C3, C20, D7
1.3		B1, D21
1.2		
1.1		B4, B13, C9, D2
1.0	C22	D11
0.9	C3	D15, E23
0.8		
0.7	C14	B12, C19
0.6	C17, D16, D24	B6, B10
0.5	C5	
0.4	D7	C22
0.3		
0.2	D21	A8
0.1	C9, D11, E23	
0	B10, C20, A25	
-0.1	A8, B13, C19	
-0.2		
-0.3		
-0.4	D2, D15	
-0.5		
-0.6	B1	
-0.7	B4, B6	
-0.8		
-0.9		
-1.0 & below	B12, B18	B18

KEY: Broken lines represent confidence intervals. Positive differences refer to the group listed first in the comparison and indicate a lower Delta on that item for that group. Conversely, negative differences indicate that the second-mentioned group had a lower Delta on that item. For example, item B1 in the comparison between L.A. whites and D.C. Blacks was six-tenths of a point easier for D.C. Blacks than for the L.A. Whites.